Use **elimination** to solve the system of equations (Multiplication):

$$\begin{matrix}\mathbf{2x+3y=18}\\ \mathbf{5x-y=11}\end{matrix} \qquad \begin{matrix}2x+3y=18\\ \underline{\mathbf{3}\cdot(5x-y)=\mathbf{3}\cdot(11)}\end{matrix}$$

Multiply by 3, bottom equation.

Simplify

$$\begin{matrix}2x+3y=18\\ \underline{15x-3y=33}\end{matrix}$$

Eliminate the y variable.

Plus(+)

$$\begin{matrix}2x+3y=18\\ \underline{+(15x-3y=33)}\\ 17x=51\end{matrix}$$

Treat each column separately

$$\begin{matrix}2x & 3y & 18\\ \underline{+(15x)} & \underline{+(-3y)} & \underline{+(33)}\\ 17x & 0 & 51\end{matrix} \quad = \quad$$

Watch the sign of the Coefficient or Constant

$$\frac{17x}{17}=\frac{51}{17}$$

$$\mathbf{x=3}$$ Now substitute this value into either equation

Top

$$\begin{matrix}2x+3y=18\\ 2(3)+3y=18\\ 6+3y = 18\\ \underline{-6 \quad -6}\\ 3y=12\end{matrix}$$

Bottom

$$\begin{matrix}5x-y=11\\ 5(3)-y=11\\ 15-y = 11\\ \underline{-15 \quad -15}\\ -y=-4\end{matrix}$$

$$\frac{3y}{3}=\frac{12}{3}$$

$$\mathbf{y=4}$$

same

$$(-1)\cdot(-y)=(-1)\cdot(-4)$$

$$\mathbf{y=4}$$

Intersection Point $(3, 4)$

Our goal is to find the **point of intersection** for both equations of the line.